Amendments to the Specification

Please replace the paragraph beginning at page 14, line 25, with the following rewritten paragraph.

An object ~~of Claim 1~~ of the present invention is to provide an optical fiber interference sensor capable of attaining a high precision result of measurement even with a simple configuration including the signal processing system, in particular.

Please replace the paragraph beginning at page 15, line 5, with the following rewritten paragraph.

In addition, an object ~~of Claim 2~~ of the present invention is to provide an optical fiber interference sensor capable of effectively performing a measurement in particular in the case that a non-required component of high frequency is contained in the measured signal.

Please replace the paragraph beginning at page 15, line 10, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 3~~ of the present invention is to provide, in particular, an optical fiber interference sensor in which the high precision measurement can be realized by a simple configuration.

Please replace the paragraph beginning at page 15, line 14, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 4~~ of the present invention is to provide, in particular, an optical fiber interference sensor capable of removing or restricting a non-required component more effectively.

Please replace the paragraph beginning at page 15, line 18, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 5~~ of the present invention is to provide, in particular, an optical fiber interference sensor capable of realizing either removal or restriction of a non-required component by a simple and effective processing.

Please replace the paragraph beginning at page 15, line 22, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 6~~ of the present invention is to provide, in particular, an optical fiber interference sensor capable of realizing either removal or restriction of a non-required component by a simple and effective processing.

Please replace the paragraph beginning at page 15, line 26, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 7~~ of the present invention is to provide, in particular, an optical fiber interference sensor capable of performing either removal or restriction of a non-required component more effectively and realizing a high precision measurement.

Please replace the paragraph beginning at page 16, line 5, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 8~~ of the present invention is to provide, in particular, an optical fiber interference sensor capable of realizing a high precision measurement by a simple configuration.

Please replace the paragraph beginning at page 16, line 9, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 9~~ of the present invention is to provide, in particular, a signal processing system of an optical fiber interference sensor capable of attaining a result of high precision measurement even with a simple configuration including a signal processing system.

Please replace the paragraph beginning at page 16, line 14, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 10~~ of the present invention is to provide, in particular, a signal processing system for an optical fiber interference sensor capable of performing an effective measurement even in the case that the measured signal contains a high frequency non-required.

Please replace the paragraph beginning at page 16, line 19, with the following rewritten paragraph.

An <u>additional</u> object ~~of Claim 11~~ of the present invention is to provide, in particular, a recording medium capable being read by a computer having a program recorded to enable a result of high precision measurement to be carried out even by a simple configuration including

also a signal processing system as to the signal processing of the optical fiber interference sensor by the computer.

Please replace the paragraph beginning at page 16, line 26, with the following rewritten paragraph.

An additional object ~~of Claim 12~~ of the present invention is to provide, in particular, a recording medium capable being read by a computer having a program recorded to enable an effective measurement to be carried out even in the case that the measured signal contains a non-required component of high frequency as to the signal processing of the optical fiber interference sensor by the computer.

Please replace the paragraph beginning at page 17, line 7 with the following rewritten paragraph.

In particular, an additional object ~~of Claim 13~~ of the present invention is to provide an optical fiber interference sensor capable of attaining a result of high precision measurement by a simple configuration.

Please replace the paragraph beginning at page 17, line 11, with the following rewritten paragraph.

In addition, an further object ~~of Claim 14~~ of the present invention is to provide an optical fiber interference sensor, in particular, capable of effectively removing or restricting a non-required component of a high frequency and a low frequency.

Please replace the paragraph beginning at page 17, line 16, with the following rewritten paragraph.

In addition, an further object ~~of Claim 15~~ of the present invention is to provide an optical fiber interference sensor, in particular, capable of effectively removing or restricting a non-required component of a high frequency and a low frequency.

Please replace the paragraph beginning at page 17, line 21, with the following rewritten paragraph.

An additional object ~~of Claim 16~~ of the present invention is to provide an optical fiber interference sensor, in particular, capable of removing or restricting a non-required component more effectively.

Please replace the paragraph beginning at page 17, line 25, with the following rewritten paragraph.

An additional object ~~of Claim 17~~ of the present invention is to provide an optical fiber interference sensor, in particular, capable of removing or restricting a non-required component effectively and realizing measurement of high precision.

Please replace the paragraph beginning at page 18, line 3, with the following rewritten paragraph.

An additional object ~~of Claim 18~~ of the present invention is to provide an optical fiber interference sensor, in particular, capable of removing or restricting a non-required component more effectively and realizing measurement of high precision.

Please replace the paragraph beginning at page 18, line 7, with the following rewritten paragraph.

An additional object ~~of Claim 19~~ of the present invention is to provide a signal processing system for an optical fiber interference sensor, in particular, capable of realizing a result of high precision of measurement even with a simple configuration.

Please replace the paragraph beginning at page 18, line 12, with the following rewritten paragraph.

An additional object ~~of Claim 20~~ of the present invention is to provide a recording medium capable of being read with a computer having a program recorded therein to enable a result of high precision of measurement to be attained even with a simple configuration of measuring system in regard to a signal processor by the optical fiber interference sensor with a computer.

Please replace the paragraph beginning at page 75, line 18, with the following rewritten paragraph.

That is, in accordance with the optical fiber interference sensor ~~of Claim 1~~ of an embodiment of the present invention, there is provided a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance varied in response to physical quantities such as force, strain, pressure and temperature and the like, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source is guided to said the other optical fiber, either a reflected light or a transmission light modulated

in wavelength in correspondence with a clearance size of said measured clearance through multiple reflection at said measured clearance is guided by the optical fiber, optical intensities in time-series corresponding to a clearance variation are attained by an optical intensity distribution sensor, either a minimum optical intensity position or a maximum optical intensity position is detected to attain said measured clearance and a value of said physical quantity is measured, and a wide range light source having a wide wavelength spectrum distribution acting as said low coherence light source is used; a desired optical correlation signal is extracted from the output signal in time-series of said optical intensity distribution sensor by the optical correlation signal extracting means;
either a minimum position or a maximum position at said optical correlation signal is calculated by an extreme value position calculating means in reference to said optical correlation signal outputted from said optical correlation signal extracting means, thereby influence caused by some non-required signal components such as low frequency fluctuation and noise or the like can be effectively restricted by a simple configuration, a high precision result of measurement can be attained by a simple adjustment of an optical system and by a simple signal processing for the detected signal and in particular, a high precision result of measurement can be attained even with the simple configuration including the signal processing system.

Please replace the paragraph beginning at page 77, line 9, with the following rewritten paragraph.

Further, in accordance with the optical fiber interference sensor ~~of Claim 2~~ of an embodiment of the present invention, there is provided a Fabry-Perot optical fiber interference sensor in which a wide range light source having a wide wavelength spectrum distribution is used as said low coherence light source; a desired optical correlation signal is extracted from the output signal in time-series of said optical intensity distribution sensor; a high frequency non-required component in the optical correlation signal outputted from said optical correlation signal extracting means is removed by a high frequency component removing and processing means; and either a minimum position or a maximum position at said optical correlation signal is attained by an extreme value position calculating means in reference to said optical correlation signal having the high frequency non-required component removed which is outputted from said high frequency component removing and processing means, thereby in particular, an effective

measurement can be carried out even in the case that a high frequency non-required component is contained in the measured signal.

Please replace the paragraph beginning at page 78, line 3, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor of ~~Claim 3~~ a further embodiment of the present invention, in particular, a high precision measurement can be realized by a simple configuration by an arrangement in which said wide range light source is one of a halogen lamp and a white light emitting diode.

Please replace the paragraph beginning at page 78, line 8, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor ~~of Claim 4~~ a further embodiment of the present invention, said optical correlation signal extracting mean includes a background signal removing means for removing a background signal varied in response to said measured clearance from an output of said optical intensity distribution sensor, thereby in particular, the non-required component can be removed or restricted more effectively.

Please replace the paragraph beginning at page 78, line 16, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor according to ~~Claim 5 of~~ a further embodiment of the present invention, said background signal removing means includes means for estimating a background signal by at least square multinomial fitting and for removing the background signal varied in reference to said measured clearance from an output of said optical intensity distribution sensor, thereby in particular, either removal or restriction of the non-required component can be realized by a simple and effective processing.

Please replace the paragraph beginning at page 78, line 25, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor of ~~Claim 6~~ a further embodiment of the present invention, said background signal removing means includes means for removing a background signal varied in reference to said measured clearance from an output of said optical intensity distribution sensor while an actual measured practical data under a state not including an optical correlation signal in a desired measuring range is being applied as a background

signal, thereby in particular, either removal or restriction of the non-required component can be realized by a simple and effective processing.

Please replace the paragraph beginning at page 79, line 9, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor of ~~Claim 7~~ a further embodiment of the present invention, said extreme value position calculating means includes;

a smoothing differential processing means for smoothing differential processing said optical correlation signal in response to a multinomial adaptation smoothing method; and

a zero-cross point calculating means for calculating a zero-cross point where an output of said smoothing differential processing means crosses with a level zero, thereby in particular, a non-required component can be removed or restricted more effectively and a high precision measurement can be realized.

Please replace the paragraph beginning at page 79, line 21, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor according to ~~Claim 8~~ a further embodiment of the present invention, said high frequency component removing and processing means includes a low-pass filter, thereby in particular, a high precision measurement can be realized by an easy configuration.

Please replace the paragraph beginning at page 79 line 26, with the following rewritten paragraph.

Further, in accordance with the signal processing system of an optical fiber interference sensor ~~of claim 9~~ of a further embodiment of the present invention that is a signal pressing system of a signal processing system of a signal processing system of a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source is guided to said the other optical fiber, either a reflected light or a transmission light modulated in wavelength in correspondence with a clearance size of said measured clearance through multiple reflection at said measured clearance is guided by the

optical fiber, optical intensities in time-series corresponding to a clearance variation are attained by an optical intensity distribution sensor, either a minimum optical intensity position is attained to measure said measured clearance, wherein a wide range light source having a wide wavelength spectrum distribution acting as said low coherence light source is used; a desired optical correlation signal is extracted from the output signal in time-series of said optical intensity distribution sensor by an optical correlation signal extracting means; and either a minimum position or a maximum position at said optical correlation signal is attained by an extreme value position calculating means in reference to the optical correlation signal outputted from said optical correlation signal extracting means, thereby in particular, even a simple configuration including the signal processing system can become possible to attain a high precision result of the measurement.

Please replace the paragraph beginning at page 81, line 9, with the following rewritten paragraph.

In addition, in accordance with the signal processing system for the optical fiber interference sensor ~~of Claim 10~~ of the present invention that is a signal processing system of a signal processing system of a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source is guided to said the other optical fiber, either a reflected light or a transmission light modulated in wavelength in correspondence with a clearance size of said measured clearance through multiple reflection at said measured clearance is guided by the optical fiber, optical intensities in time-series corresponding to a clearance variation are attained by an optical intensity distribution sensor, either a minimum optical intensity position or a maximum optical intensity position is attained to measure said measured clearance, wherein a wide range light source having a wide wavelength spectrum distribution is used as said coherence light source; a desired optical correlation signal is extracted by said optical correlation signal extracting means from the output signal in time-series of said optical intensity distribution sensor; a high frequency non-required component in the optical correlation signal outputted from said optical correlation signal extracting means is

removed by a high frequency component removing and processing means, either a minimum position or a maximum position at said optical correlation signal is attained by an extreme value position calculating means from an optical correlation signal having high frequency non-required component outputted from said high frequency component and removing means, thereby in particular, an effective measurement can be carried out even when the high frequency non-required component is contained in the measured signal.

Please replace the paragraph beginning at page 82, line 22, with the following rewritten paragraph.

In addition, in accordance with a recording medium capable of being read by a computer ~~of Claim 11~~ of the present invention, when a signal processing is carried out by a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source having a wide range of wavelength spectrum distribution is guided to said the other optical fiber, either a reflected light or a transmission light modulated in wavelength in correspondence with a clearance size of said measured clearance through multiple reflection at said measured clearance is guided by the optical fiber, optical intensities in time-series corresponding to a clearance variation are attained by an optical intensity distribution sensor, either a minimum optical intensity position or a maximum optical intensity position is attained to measure said measured clearance, a program to cause a computer to act as an optical correlation signal extracting means for extracting a desired optical correlation signal from an output signal in time-series of said optical intensity distribution sensor; and

an extreme value position calculating means for attaining either a minimum position or a maximum position in said optical correlation signal from the optical correlation signal from the optical correlation signal outputted from said optical correlation signal extracting means;
is recorded and executed, in particular as to the signal processing of the optical fiber interference sensor by the computer, it becomes possible to attain a high precision result of measurement even with the simple configuration including the signal processing system.

Please replace the paragraph beginning at page 84, line 7, with the following rewritten paragraph.

In addition, in accordance with the recording medium capable of being read by a computer ~~of Claim 12~~ of the present invention, there is recorded and executing a program to cause the computer to act as;

an optical correlation signal extracting means for extracting a desired optical correlation signal from an output signal in time-series of an optical intensity distribution sensor;

a high frequency component removing and processing means for removing a high frequency non-required component in the optical correlation signal outputted from said optical correlation signal extracting means; and

an extreme value position calculating means for attaining either a minimum position or a maximum position in said optical correlation signal from the optical correlation signal outputted from said high frequency component removing and processing means and having a high frequency non-required component removed;

when a signal processing is carried out at a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source having a wide range of wavelength spectrum distribution is guided to said the other optical fiber, either a reflected light or a transmission light modulated in wavelength in correspondence with a clearance size of said measured clearance through multiple reflection at said measured clearance is guided by the optical fiber, optical intensities in time-series corresponding to a clearance variation are attained by said optical intensity distribution sensor, either a minimum optical intensity position or a maximum optical intensity position is attained to measure said measured clearance, thereby in particular, as for the signal processing at the optical fiber interference sensor performed by the computer, an effective measurement can be carried out even in the case that a high frequency non-required component is contained in the measured signal.

Please replace the paragraph beginning at page 85, line 24, with the following rewritten paragraph.

In addition, in accordance with the optical fiber interference sensor of ~~Claim 13~~ the present invention, there is provided a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance varied in response to physical quantities such as force, strain, pressure and temperature and the like, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source is guided to said the other optical fiber, any one of a reflected light and a transmission light modulated in wavelength in correspondence with said clearance size at said measured clearance is guided by the optical fiber, the light is condensed linearly in a uniform optical intensity distribution, radiated onto a linear image sensor through a Fizeau interferometer, a maximum optical intensity position at said linear image sensor is detected from an output of said linear image sensor to attain said measured clearance, wherein a desired optical correlation signal is extracted from the output signal in time-series of said linear image sensor by an optical correlation signal extracting means; a high frequency non-required component and a low frequency non-required component are removed by a non-required component removing and processing means; an envelope component is attained by an envelope calculating means in response to the signal and signal shifted by 90° with a phase shift processing means; and at the same time, the envelope component is differentiated by a peak position calculation means, a zero-cross point where said differentiated value crosses with the level zero is attained, a peak position indicating the gap clearance size corresponding to said physical quantities is calculated, thereby influence caused by fluctuation of the low frequency and non-required signal components such as noise can be removed or restricted effectively by a simple configuration and a high precision result of measurement can be attained also by an easy adjustment of the optical system.

Please replace the paragraph beginning at page 87, line 13, with the following rewritten paragraph.

In addition, in accordance with the optical fiber interference sensor ~~of Claim 14~~ of the present invention,

said non-required component removing and processing means includes;

a low-pass filter processing means for removing a high frequency noise component from an output of said optical correlation signal extracting means through the low-pass filter processing; and

a high-pass filter processing means for removing a low frequency non-required component from an output of said low-pass filter processing means through a high-pass filter processing, thereby in particular, both high frequency non-required and low frequency components can be removed or restricted effectively.

Please replace the paragraph beginning at page 88, line 1, with the following rewritten paragraph.

In addition, in accordance with the optical fiber interference sensor ~~of Claim 15~~ of the present invention, said non-required component removing and processing means is comprised of;

a low-pass filter processing means for removing a high frequency noise component from an output of said optical correlation signal extracting means by a low-pass filter processing; and

a least square processing means for removing a low frequency non-required component from said low pass filter processing means by a least square fitting method, thereby in particular, high frequency non-required and low frequency components can be removed or restricted effectively.

Please replace the paragraph beginning at page 88, line 12, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor ~~of Claim 16~~ of the present invention, said phase shift processing means includes a phase shift processing means for shifting a phase of an output of said non-required component removing and processing means by 90° by performing a Hilbert transform against an output of said non-required component removing and processing means.

Please replace the paragraph beginning at page 88, line 19, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor ~~of Claim 17~~ of the present invention, said envelope calculating means includes;

means for calculating a square root of square sum to attain an envelope component of an output of said non-required component removing and processing means by calculating a square root of square sum of an output of said non-required component removing and processing means

and an non-required component removing and processing means and an output of a phase shift processing means with its phase being shifted by 90°, thereby an envelope component of the output of said non-required component removing and processing means; and

a high frequency removing means for removing a high frequency non-required component of output of said means for calculating a square root of square sum by a low-pass filter processing, thereby in particular, the non-required component can be removed or restricted effectively and a high precision measurement can be realized.

Please replace the paragraph beginning at page 89, line 12, with the following rewritten paragraph.

In accordance with the optical fiber interference sensor of ~~Claim 18~~ the present invention, said peak position calculating means includes;

a smoothing and differentiating processing means for smoothing and differentiating processing an output of said envelope calculating means in response to a multinomial adaptation smoothing method; and

a zero-cross point calculating means for attaining a zero cross-point where an output of said smoothing and differentiating processing means crosses with a level zero, thereby in particular, the non-required components can be removed or restricted effectively and a high precision measurement can be measured.

Please replace the paragraph beginning at page 89, line 24, with the following rewritten paragraph.

In accordance with the signal processing system of an optical fiber interference sensor ~~of Claim 19~~ of the present invention, there is provided a signal processing system of a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source is guided to said the other optical fiber, one of a reflected light and a transmission light modulated in wavelength in correspondence with a clearance size of said measured clearance through multiple reflection at said measured clearance is guided by the optical fiber, light is condensed in a linear manner under a uniform optical intensity distribution,

radiated onto a linear image sensor through a Fizeau interferometer to measure said measured clearance, a desired optical correlation signal is extracted from the output signal in time-series of said linear image sensor by an optical correlation signal extracting means; a high frequency non-required component and a low frequency non-required component of an output of said optical correlation signal extracting means are removed by the non-required component removing and processing means; a phase of output of said non-required component removing and processing means is shifted by 90° by the phase shift processing means, the envelope component of output of said non-required component removing and processing means is attained by the envelope calculating means in response to an output of said non-required component removing and processing means and an output of the phase shift processing means with its phase being shift by 90Åã, an output of said envelope calculating means is differentiated by a peak position calculating means to attain a zero-cross point where the differentiated value may cross with the level zero, thereby in particular, a high precision result of measurement can be attained even with a simple configuration.

Please replace the paragraph beginning at page 93, line 24, with the following rewritten paragraph.

In accordance with a recording medium capable of being read by a computer ~~of Claim 20~~ of the present invention, there is provided a signal processing system of a Fabry-Perot there is provided a signal processing system of a Fabry-Perot optical fiber interference sensor having a sensor part having opposed surfaces formed as parallel planes to each other in a measured clearance, having a partial reflection mirror or an end surface of one optical fiber formed with a partial reflection mirror arranged in one surface side of said opposed surfaces, and having an end surface of the other optical fiber formed with a partial reflection mirror arranged in the other surface side of said opposed surfaces, in which a light of low coherence light source is guided to said the other optical fiber, one of a reflected light and a transmission light modulated in wavelength in correspondence with a clearance size of the measured clearance through multiple reflection at said measured clearance is guided by the optical fiber, light is condensed in a linear manner under a uniform optical intensity distribution, radiated onto a linear image sensor through a Fizeau interferometer to calculate an optical intensity maximum position at said linear image sensor in reference to an output of said linear image sensor and to measure said measured clearance, there is recorded a program to cause a computer to act as;

an optical correlation signal extracting means for extracting a desired optical correlation signal from an output signal in time-series of said linear image sensor;

a non-required component removing and processing means for removing a high frequency non-required component and a low frequency non-required component of an output of said optical correlation signal extracting means;

a phase shift processing means for shifting by 90° a phase of an output of said non-required component removing and processing means;

an envelope calculating means for attaining an envelope component of the output of said non-required component removing and processing means in response to an output of said non-required component removing and processing means and an output of a phase shift processing means with its phase being shifted by 90°; and

a peak position calculating means for differentiating an output of said envelope calculating means to attain a zero-cross point where said differentiated value may cross with a level zero; thereby in particular, as for the signal processing by the optical fiber interference sensor, a high precision result of measurement can be attained even under application of a simple configuration of the measurement system.